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Tulsa Tornado Tribune

"Where People Who Know The Weather Get Their Weather"

National Weather Service Tulsa, Oklahoma — Spring, 2006

Widespread Tornado Damage in Delaware and Benton Counties

March 12 Storms Damage Over 500 Homes, Injure 20 People

The 2006 severe weather season kicked off with four tornadoes touching down in northeast Oklahoma and northwest Arkansas on Sunday, March 12. The twisters damaged up to 450 homes in Benton County, Arkansas, and another 67 in Delaware County, Oklahoma. Damage was also reported at Bentonville High School and at the Bentonville Airport. Fortunately, there were no fatalities due to ample lead time. Ironically, Benton County was recently certified as the nation's 1000th StormReady community.

Home heavily damaged near Twin Oaks, OK by a March 12 tornado.

A strong low pressure system moved across Kansas during the morning and afternoon, pushing a dry line into eastern Oklahoma by early evening. South winds ahead of the low pulled warm moist air in from the Gulf of Mexico. A Tornado Watch was issued at 12:45 pm for most of eastern Oklahoma and northwest Arkansas. The watch declared a "Particularly Dangerous Situation" (PDS), meaning conditions were favorable for strong or violent tornadoes.

Thunderstorms erupted along the dry during the early evening just west of Highway 75 in eastern Okla-

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Editor's Notes

Obviously, the hydrologic and agricultural impacts of the ongoing drought remain severe, but how about fire danger?

Dormant grasses are still present during the early spring and when humidity is low, the grasses dry out VERY quickly.

With this in mind, please continue to use extreme caution!

Craig A. Sullivan - Editor

The Winter That Never Was

The average temperature for January 2006 in Tulsa was 48.4 degrees, breaking the old record of 48.0 degrees set in 1923. The 48.4 degree reading was 12 degrees above the average monthly temperature for January, and was considerably warmer than the average February temperature of 42.0. At one point, the average January temperature in Tulsa was almost as warm as the monthly average for March!

Tulsa, the states of Oklahoma and Arkansas, and the contiguous United States experienced their warmest January on record.

The warm weather did not stop there, as both Oklahoma and Arkansas experienced their warmest statewide January temperatures. In fact, Oklahoma shattered its previous record by over 2 degrees. Not to be outdone, the contiguous United States recorded its warmest January, with a monthly temperature 8.5 degrees above the 1895-2005 mean.

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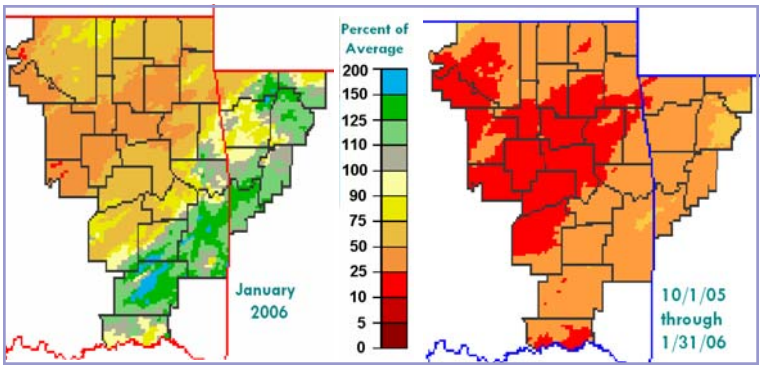
Inside this issue:

Exceptional Drought

Drought conditions have gone from extreme to exceptional across northeast Oklahoma. Most of eastern Oklahoma and portions of west central Arkansas are now classified as being in exceptional drought, the highest category of drought intensity according to the National Drought Monitor, with extreme drought conditions continuing across northwest Arkansas. The drought continues to have significant impact on both agricultural and hydrological interests.



While portions of the area received above normal rainfall in January (left), a comparison with the October through January (right) rainfall shows this does barely puts a dent in the longer term precipitation deficit.

Tulsa also experienced the driest winter (December-February) since record keeping began in 1888. Only 1.59 inches of rain fell in Tulsa, which is 3.77 inches below normal for winter. According to the Oklahoma Climatological Survey, the last 90, 120, and 180 days are the driest such periods on record for the entire state of Oklahoma. Not only has it been very dry, but also very warm across eastern Oklahoma. In Tulsa, 3 of the last 6 months have ranked in the top 20 warmest on record, and 2 of the last 6 months have ranked in the top 10 warmest months on record. Fort Smith had the 9th driest winter (December thru February) since record keeping began in 1900, receiving 2.56 inches. This is 5.51 inches below normal for winter.

Additional information about the ongoing drought can be found on the NWS Tulsa website.

Due to the drought, numerous reservoirs are well below their normal pool and stream flows are below normal for area mainstem rivers and tributaries. In northeast Oklahoma and far northwest Arkansas, the flow of several rivers and streams are near the all time recorded low. Soil moisture levels are also exceptionally low throughout the region as the primary growing season begins.

In Memoriam

The National Weather Service in Tulsa would like to express our deepest regrets in reporting that long-time WSO Fort Smith Official-in-Charge Forrest Johns passed away on Saturday, February 25, 2006, after a long battle with cancer. Forrest was 69.

A native of Lowell, Arkansas, Forrest began a career of government service spanning 50 years, with a tour of duty in the United States Air Force as a weather observer in Korea in 1955. During his four years of service in the Air Force, he was also stationed with Mobile Weather at Tinker AFB in Oklahoma City, Oklahoma, and with the Air Force Severe Storms Unit in Kansas City, Missouri.

Forrest's NWS career began in 1959 at the Shreveport, Louisiana office. He also worked at Weather Service offices in Jackson, Mississippi and King Salmon, Alaska, before returning home to Arkansas at the Little Rock office in 1968.

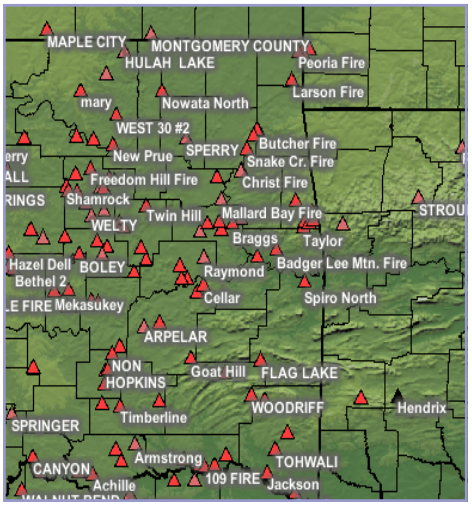
In 1970, Forrest began working at the Fort Smith office, where he would remain until 2005. He was named the Official-in-Charge of the Fort Smith office in 1997, during the modernization of the National Weather Service field office structure. He served the vitally important role as Liaison Officer during the spin-down phase of WSO Fort Smith's operations.

Our thoughts and prayers go out to his friends and loved ones alike. He is survived by his wife Mary Ann Johns, one son Michael R. Johns of Little Rock, Arkansas, one daughter Janet L. Willcutt of Lowell, Arkansas, one brother Jimmie Johns of Lake Wylie, South Carolina, one sister Carolyn Vanhook of Lowell, Arkansas and five grandchildren.

Memorial contributions may be made to Faith United Methodist Church, 2901 Massard Road, Fort Smith, Arkansas 72903, Mercy Hospice, 5401 Ellsworth Road, P. O. Box 17000, Fort Smith, Arkansas 72917 or the Forrest W. Johns Memorial Scholarship in Meteorology which is being established at Oklahoma University-contact 479-452-8696 or 405 808-0805.

Season of Fire

Wildfires raged across Oklahoma and Arkansas due to abnormally dry and warm conditions during the winter. Since November 1, over half a million acres have burned in Oklahoma, destroying hundreds of structures and killing two people.



Fires reported January 1 to March 6

A series of fast moving weather systems raced across the area during the winter, most of which were starved of significant moisture. What these systems did produce was wind, and lots of it. Gusty south winds often pushed daytime temperatures into the 60s and 70s, usually with very low humidity. Add to that the exceptional drought conditions, and the abundance of dormant native grasses, and the stage was set for very volatile fire conditions.

A strong surface low tracked across Kansas and Missouri on December 27, producing gusty southwest winds of 30 to 40 mph, along with very warm and dry conditions. Several major fires were reported, including a very large fire near Okemah, which required deployment of a Blackhawk helicopter. On December 29, a State of Emergency was declared for all 77 counties in Oklahoma.

The new year got off to a record warm start, and unfortunately, a fiery one as wildfires raged on New Year's Day. A fire near Shamrock, OK destroyed one home and an abandoned school building that dated to the 1920's. The statewide burn ban was expanded to prohibit campfires and charcoal grills.

A brief break came January 9-10 as light rain and snow fell over most of northeast Oklahoma and northwest Arkansas. However, temperatures climbed back into the 60s and 70s a few days later, sparking a new round of fires on the 12th. Fires also erupted on the 15th and 18th.

The first significant rain in several weeks fell in southeast Oklahoma and west central Arkansas the last week of January, with cooler temperatures and higher humidity. This gave firefighters a chance for some much needed rest and time to do routine maintenance on equipment.

Conditions deteriorated soon enough, as warm and windy conditions returned on the 31st. Fire crews began battling fires before noon and continued well into the night. One fatality was reported as an elderly man was killed near Peggs, OK.

More fire erupted in mid-February. A large fire near Braggs, OK on the 16th destroyed two homes and a rail car. By the 17th, an arctic cold front provided one of the few real tastes of winter. The cold temperatures and light snow and sleet gave fire fighters another chance to get caught up.

March came in like a lion, with record high temperatures, including 93 degrees at Tulsa, the warmest ever so early in the season. The hot and windy conditions spawned yet another round of fires, reminding us that this fire season is likely to continue for a while longer.

Tornado Damage

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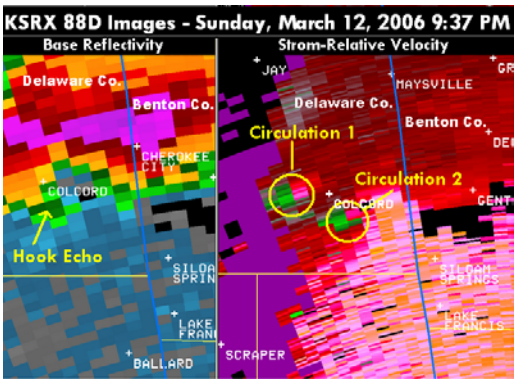
homa, rapidly becoming severe in the unstable airmass that was in place across the region. The thunderstorms began to exhibit supercell characteristics as they moved east. At approximately 9:09 pm, a tornado touched down in northern Cherokee County and moved northeast across southern Delaware County. By 9:49 pm, this supercell moved into northwest Arkansas, ultimately producing three tornadoes in Benton and Carroll Counties.

Initial surveys indicated damage along a 27 mile path through Cherokee and Delaware Counties in northeast Oklahoma, with a rating of F3 based on damage 4 miles west-southwest of Colcord. Eight people were injured.



The process of a "cycling" supercell. Circulation 1 was associated with the Delaware County tornadoes. Circulation 2 eventually became dominant, and went on to produce tornadoes in Benton County.

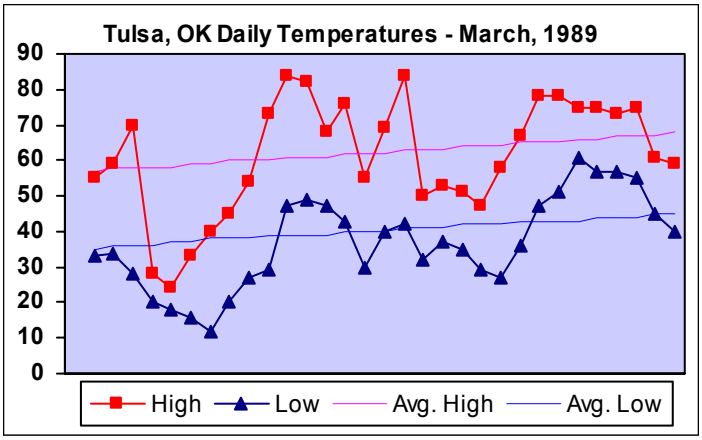
The second tornado, also rated an F3 based on damage near Centerton, touched down in western Benton County near Bloomfield. It traveled 15 miles before lifting 4 miles west of Bentonville Airport. This tornado damaged about 150 homes an injured 12 people.

A third tornado touched down just southeast of Bentonville, and lifted just south of Avoca. Numerous homes were damaged along the five-mile path, with an F2 rating. The fourth tornado touched down 6 miles northwest of Urbanette in Carroll County, and was rated an F1 with damage mainly to trees.

What Do We Mean by "Normal?"

When describing the weather in this area, "normal" may not be the first word that comes to mind. Yet, this word appears in climate reports ("high today was 5 degrees above normal"), and forecasts ("precipitation next month is expected to be below normal", "Saturday's highs will be near normal"). So, what exactly does "normal" mean in terms of weather and climatology?

In meteorological terms, "normal" is little more than a 30 year statistical *average*. Currently, the "normals" being used span the years 1971-2000. At Fort Smith for example, the "normal" January temperature is 38.0 degrees, which is the statistical mean for all Januaries from 1971-2000. During that 30 year period, January temperatures ranged from 25.6 degrees in 1979 to 45.1 in 1990. Every ten years these are updated…in 2011, a new set of "normals" covering the years 1981-2010 will become the standard.



In spite of its variability, March, 1989 was a "normal" month. When the monthly average temperature (taking both highs and lows each day into account) was computed, the departure from the climatological "normal"...0.0 degrees!

Now, the term "normal" actually has a much different meaning in statistics. It refers to a distribution of values in a data set. The theory goes, as you plot all the data values, most of the values will fall near the mean, and values that deviate significantly (called outliers) will be much less common. The distribution will have a "bell" shape…often referred to as a bell curve. This works well in many other sciences, but unfortunately, meteorology doesn't always work the way its supposed to!

The trouble is, when we hear the word normal, there is a tendency to assume this means "typical", "expected", or even "supposed to be", as this is probably the most common use of the word. Ask yourself what a typical July day is like, and you will likely think, "hot and muggy," (along with a few other choice adjectives), and that would be accurate most of the time. Now, ask yourself what a typical March day is like...not easy to describe is it? About the only accurate description of typical weather outside of summer is "variable" (though you could throw "windy" in there and get at least partial credit).

Aside from the summer doldrums, the weather patterns in Oklahoma and Arkansas are dominated by an ongoing struggle between different airmasses, creating an almost constant battle between summer and winter conditions. This is especially true of the spring and fall months, when both the polar and subtropical jet streams are regular visitors. Unlike summer, which features long stretches of hot and muggy days broken by the very rare not-quite-so-hot day, the rest of the year features frequent shifts from warm to cold (especially mid-October to mid-April). Thus, most days are either well above or well below "normal".

To illustrate this point, you could pick any day during one of the transition seasons and look at the high temperatures for that date over a number of years. Using March 10 (*see graphs on page five*) as an example, the "normal" high in Tulsa is 60 degrees. Looking back to 1948, only twice has a high of 60 degrees occurred on March 10 in Tulsa. Not only that, but a mere 11 years out of the 58 had a high temperature within 5 degrees of "normal"! The 60 degree reading is merely a statistical *average* of all the March 10th on record, and says nothing about what temperature you might expect on that date. In fact, let's use the term "average" in lieu of "normal" for the rest of this article.

The same holds true for rainfall, as monthly averages are often skewed by a small number of very high amounts, particularly in the fall. For example, the average September rainfall in Tulsa for the period 1971-2000 is 4.76 inches. This figure is skewed upward by the years 1971 (18.81 inches), 1974 (11.78 inches), and 1999 (9.69 inches), which rank as the first, third and seventh wettest Septembers on record respectively. Furthermore, 18 of the 30 Septembers between 1971 and 2000 had *below average* rainfall!

One more interesting note on this subject…when the next set of 30 year averages are published, this value could drop

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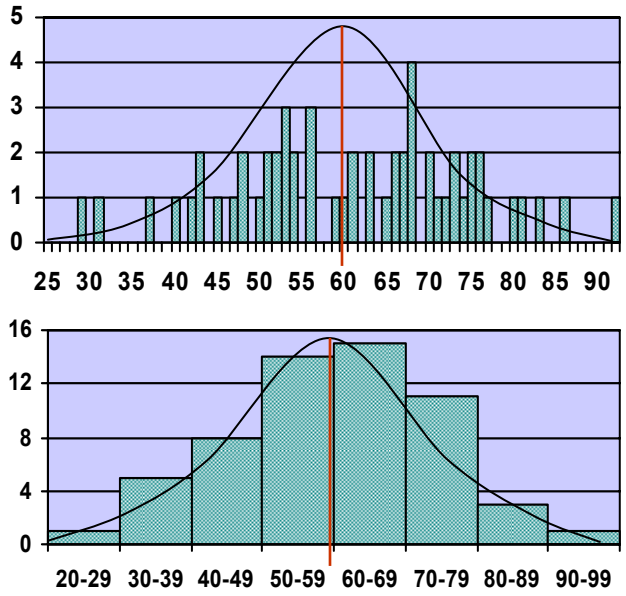
"Normal?"

(Continued from page 4)

substantially, as the very wet years 1971 and 1974 are dropped from the data set, and the years from 2001 to 2010 are added. So far, four of the five years since 2001 have seen below average September rainfall. If we make the very bold assumption that September rainfall for the next five years comes out average, after dropping 1971-1980 and adding in 2001-2010, the new September average will be 4.10 inches…more than half an inch less!

With all this in mind, one should avoid thinking of weather "normals" as what is "typical" or what "should be." However, climatological average values are very useful on the longer term and on the broader scale. With proper knowledge of their limitations, one can obtain useful information for a variety of agricultural, water and energy industry functions. As weeks turn into months and months into years, averages become far more significant...in other words, a 50% rainfall deficit over a year means much more than a 50% deficit over a week.



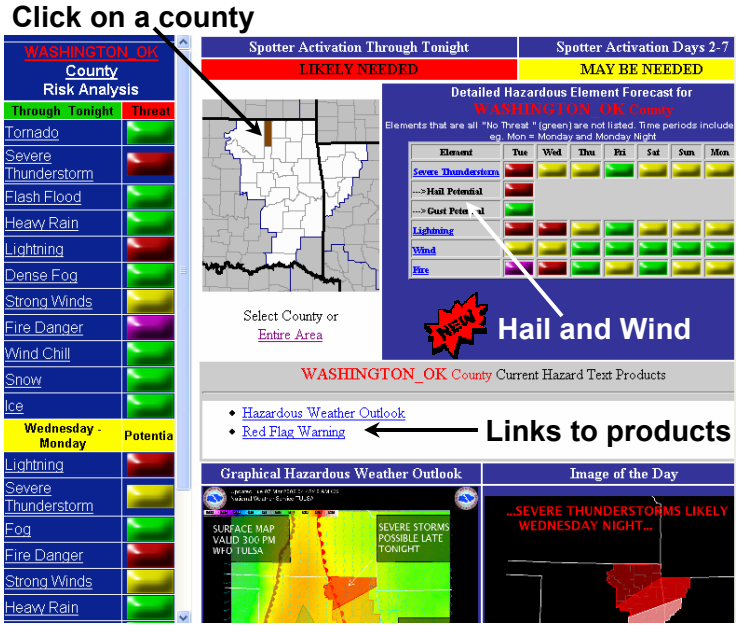
The distribution of high temperatures at Tulsa, OK for March 10, from 1948-2005. The horizontal axis is the high temperature, the vertical axis is number of occurrences for each value. When the temperature distribution is compared to a sample "normal" or bell curve distribution (black line), it does not match well at all (top). But, when temperature values are grouped into 10 degree ranges (bottom), the distribution becomes much more "normal". Maybe this means the high temperature in Tulsa on March 10 is "supposed to be" between 50 and 70 degrees?

Decision Support by County

Further improvements have been made to the NWS Tulsa "Decision Support Page." The most significant change has been the addition of county-based hazards. You can now click on the county map (see example below) to select a particular county, making the hazard "chiclets" specific to the selected county. Also, any urgent products in effect for that county will be seen as a link next to the Hazardous Weather Outlook text link. The page auto refreshes, and the text links should change within 2 minutes of any bulletin being issued. The new threat levels are set hourly at about 45 minutes past.

In addition, we have expanded our severe weather information by including a specific hail and wind index to judge those threats. We will also routinely have extended period severe weather information. So, this spring, you will actually see a severe weather threat for Day 7 as appropriate. We have also expanded the number of images to include all seven days instead of just the first or most significant occurrence of a particular hazard.

This type of forecasting is a rather new concept for the National Weather Service. It is based on forecasting the *ingredients* of the hazard (dew point, lifted index, etc.) and not just the hazard itself. For example, the forecast may include a limited fire weather risk initially, but later data suggests stronger winds than originally anticipated. The forecast could be adjusted to indicate the stronger winds, which would change the "spread index" and result in a higher level of fire threat.



New Decision Support Page. For example, by clicking on the map as shown, you can get the 7 day hazard grid and products specifically for Washington County, OK.

Red Sky at Morning

Last fall, we presented a couple of well known weather adages, and explained why they often hold true. Many other such observations have been passed around for generations, in the form of catchy proverbs. While those who coined them many years ago were likely unaware, some have been shown to have plenty of scientific merit.

Red sky at morning, sailors take warning,
Red sky at night, sailor's delight.

Weather systems typically move from west to east, and red clouds result when the sun shines on their undersides at either sunrise or sunset. At these two times of day, the sun's light is passing at a very low angle through a great thickness of atmosphere, resulting in the absorption of most of the shorter wavelengths (greens, blues, and violets) of the visible spectrum, and giving the sunlight a reddish appearance. If the morning skies are red, it is likely that clear skies to the east permit the sun to light the undersides of moisture-bearing clouds coming in from the west. Conversely, for red clouds in the evening, sunlight must have a clear path from the west in order to illuminate moisture-bearing clouds moving off to the east.

Frost or dew in the morning light,
Shows no rain before the night.

The formation of frost or dew requires night time cooling which usually occurs only on very clear, calm nights. Such a night is usually followed by fair, sunny daytime weather, so inclement weather would be unlikely. However, a weather system moving very rapidly could arrive during the day, thus interfering with this proverb.

A cow with its tail to the west makes the weather best,
A cow with its tail to the east makes the weather least.

This is similar to a common fishing proverb, but despite countless hours of testing, I have yet to determine whether fish truly "*bite best with the wind from the west*" (additional research will be needed). Cows, on the other hand, spend a lot of time standing around exposed to the elements, but prefer not to have the wind in their faces. Thus, they typically stand with their backs to the wind. Since west winds typically mean arriving or continuing fair weather and east winds usually indicate arriving or continuing unsettled weather, a strategically placed cow (a cowvane?) might give some insight of weather to come.

If birds fly low,
Expect rain and a blow.

When the air pressure is high, it is easier for birds to fly at a higher altitude. But, if the air pressure is low, normally indicating bad weather, birds cannot fly as high because the air is less dense.

Finally, perhaps the most true weather proverb of all is this ode to the weatherman:

And in the dying embers
These are my main regrets:
When I'm right no one remembers;
When I'm wrong no one forgets.

What to Report

- *Tornadoes*
- *Funnel Clouds*
- *Rotating Wall Clouds*
- *Hail 3/4" or larger*
- *Wind Gusts > 50 mph*
- *Flooding*
- *Storm damage*
- *Known Injuries/Fatalities*

Severe Weather Line:

1-800-722-2778

StormReady Ceremony Set

The National Weather Service will officially recognize Benton County, Arkansas., as the nation's 1,000th StormReady community. Benton County officials will be presented with a formal recognition letter and StormReady signs during a ceremony at 11:00 AM, April 7 at the Northwest Arkansas Community College's Wal-Mart Auditorium Shewmaker Center on in Rogers, Arkansas.

Winter

(Continued from page 1)

No climate divisions in the lower 48 states experienced below average temperatures. Fifteen states in the northern Plains, Great Lakes and Midwest saw record warm monthly temperatures. For only the third time since 1895, almost three-fourths of the nation was classified as "much above normal" for the month - March, 1910 and November, 1999 were the others.